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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,712	03/29/2004	Sergei L. Sochava	42P18525	1418

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R. Alan Burnett
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025

EXAMINER

MENEFEE, JAMES A

ART UNIT	PAPER NUMBER
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2828

DATE MAILED: 10/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/811,712

Applicant(s)

SOCHAVA ET AL.

Examiner

James A. Menefee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

By amendment filed 8/11/2006, claims 1, 10, and 14 are amended. Claims 1-37 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 22-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Parent claim 14 has been amended to include in the integrated structure a modulator section, the waveguide passing through the modulator section, and a facet of the modulator defining the front facet of the integrated structure. Given these additions, it is not clear what is meant by dependent claims 22-24.

Claim 22 requires "a modulator optically coupled to the waveguide at the front facet." It is not apparent how this limitation can coexist with amended claim 14, which already includes a modulator, which includes the waveguide, and the modulator defines the front facet.

Claim 23 is acceptable, except it is dependent on claim 22. It should be noted that if claim 23 were made directly dependent on claim 14, Zah teaches that the modulator may be one of the claimed types. Col. 4 lines 43-45.

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Claim 24 requires "coupling optics disposed between the modulator and the front facet." This, however, does not make sense in light of claim 14 requiring that the modulator defines the front facet; how can the modulator define the front facet and there also be optics between the modulator and the front facet?

It appears that such claims were drawn to an embodiment such as applicant's Fig. 3d, where the modulator was not part of the integrated structure. In light of the amendment to claim 14, however, the modulator is a part of the integrated structure and thus the claims are drawn to embodiments such as Fig. 3a where the modulator, gain, and phase sections are integrated. These dependent claims do not make sense in such an embodiment, thus they are indefinite. Note that no prior art is used to reject these claims, given that the combination is apparently not possible.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-5, 7, 9, 13-14, 18, 26, 28, 30-31, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,295,308 to Zah ("Zah") in view of US 6,137,814 to Brosnon et al. ("Brosnon").

Independent claims:

Regarding claim 1, Zah discloses in Fig. 1 an apparatus comprising an integrated structure having front and rear facets optically connected via a waveguide passing therethrough

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(a waveguide is an inherent feature of such semiconductor lasers for guiding light through the structure), the integrated structure further including a gain section 16 to emit a plurality of photons in response to a first electrical input, having a facet 26 defining the rear facet of the structure, a modulator section 14 disposed to modulate an optical output passing through the modulator in response to an electrical signal, and having a facet 56 defining the front facet of the structure, and a partially reflective mirror 40 disposed between the gain section and modulator section. Note that the electrical signals applied to the gain and modulator sections are inherent parts of the device in order to cause operation of the device.

It is not disclosed that there is a phase control section that modulates an optical path length of the waveguide passing therethrough in response to a second electrical signal, located as claimed. Brosnon teaches that in similar lasers it is known to include a phase control portion located as claimed and to apply an electrical signal to this phase section. See Fig. 6 and col. 6 lines 35-60. It would have been obvious to one skilled in the art to include such a phase control section in order to correct for or eliminate adiabatic frequency variations of the modulator, as taught by Brosnon.

Regarding claim 14, the limitations are taught similarly to claim 1 above. Zah additionally discloses reflective element 11 disposed opposite the non-reflective rear facet 26, said reflector may also be a tunable filter. Col. 4 lines 55-60. It is not explicitly disclosed that the integrated structure and mirror/tunable filter are operatively coupled to a base. However, it is inherent that the elements will not be floating in space; they will necessarily be coupled to some sort of base. Even if it is not inherent, it would have been obvious to include the elements on a base to provide for operational stability, as the elements will then not be free to move around.

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Regarding claim 26, the limitations are taught similarly as with claims 1 and 14 above.

Regarding claim 35, the limitations are taught similarly as with claim 26 above. The limitations as to the telecommunications switch (i.e. fiber line cards, transmitter and receiver bank) are all typical in the art, and one skilled in the art would include them if using Zah's system for communications.

Dependent claims:

Regarding claim 3, Zah's partially reflective mirror is substantially perpendicular to the waveguide proximate the mirror.

Regarding claim 4, 28, Zah's partially reflective mirror may be an etched air gap. Col. 5 lines 29-37.

Regarding claims 5 and 7, the etching may be done in either fashion depending on the position of the waveguide relative to the substrate's crystalline plane. It does not appear to be important to applicant's invention which way the etching is done, and one skilled in the art would have been inclined to do it either way to achieve the desired result.

Regarding claims 9, 18, 30 Zah discloses that the modulator is blue shifted from the gain section by 80 nm. Col. 5 lines 5-10. Applicant admits that a blue shift of 100 nm is within the claimed range. One may conceivably say that Zah's value is "approximately" the claimed value as required by the claim. In any case, the claimed values do not purport to provide any unexpected result, and would seem to operate substantially the same as Zah's value, therefore a prima facie case of obviousness has been made. See MPEP 2144.05 ("[A] prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties.") Note

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that upon Brosson's modification, the phase and modulator sections may be made of identical structure to ease fabrication, col. 6 lines 48-52, therefore the phase control portion will have the claimed broadening of bandgap similarly to the modulator portion.

Regarding claim 13, the particular material used in the device is not disclosed. However, InGaAsP is widely used in semiconductor laser devices. It would have been obvious to one skilled in the art to use InGaAsP as the material for the laser since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 277 F.2d 197, 125 USPQ 416 (CCPA 1960). The laser material has a large effect on output wavelength, thus the skilled artisan would select the material depending on the preferred output wavelength for the particular application.

Regarding claim 31, a controller for supplying control inputs to the elements is not explicitly disclosed. However, there will inherently be some form of controller that will control the input currents to each of the elements. How can the device operate if there is no control over how the inputs are provided?

Claims 2, 6, 15, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zah and Brosson as applied to the claims above, and further in view of US 2002/0131466 to Salvatore et al. ("Salvatore"). Zah and Brosson teach the limitations of the claims as above, but do not teach that the waveguide is tilted with respect to the facets. Salvatore teaches that in a laser the waveguide may be tilted with respect to the facets, see Fig. 4, and it would have been obvious to one skilled in the art to do so to reduce destabilizing effects caused by the facets, as

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taught by Salvatore. See par. [0040]. Regarding claim 25, see the rejection of claim 13 above; the rejection is included here due to the dependency on claim 15.

Regarding claim 6, as noted above it would have been obvious to one skilled in the art to tilt the waveguide with respect to the facets. But one skilled in the art would not have wanted to tilt with respect to Zah's partially reflecting mirror 40, or else the reflector would not properly do its job. One skilled in the art would therefore make the waveguide tilted with respect to the facets for the advantage noted above, but keep the waveguide perpendicular with respect to the air gap mirror so that the mirror will still work as intended in Zah.

Claims 8, 17, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zah and Brosseau as applied to the claims above, and further in view of US 6,822,981 to Jacquet ("Jacquet"). Zah and Brosseau teach the limitations of the claims as above, and Zah discloses that the partially reflective mirror may be a Bragg grating, see Fig. 4, but it is not disclosed that the grating may be chirped. Jacquet teaches that chirped gratings may be used, and it would have been obvious to one skilled in the art to do so in order to provide increased modal stability. See col. 7 lines 59-63.

Claims 10-12, 19-21, are rejected under 35 U.S.C. 103(a) as being unpatentable over Zah and Brosseau as applied to the claims above, and further in view of the admitted prior art. Zah and Brosseau teach the limitations of the claims as above, but do not disclose that the various claimed techniques are used in configuring the waveguide. Yet, all of these techniques are known in the art, and applicant admits as much via the various citations to other references. See specification

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pages 16-17 (pars. [0060]-[0062]). It would have been obvious to one skilled in the art to employ such techniques as they have the various advantages noted by applicant in this section.

Claims 27, 32-34, and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zah and Brosion as applied to the claims above, and further in view of US 2002/0172239 to McDonald et al. ("McDonald"). Zah and Brosion teach the limitations of the claims as above, but do not disclose that there is thermal control, that the tunable filter may be two filters and thermally controlled, or provide Vernier tuning as claimed. McDonald teaches an external cavity laser system including two tunable filters that are thermally controlled and may provide Vernier tuning as claimed. See, e.g., pars. [0046]-[0051]. It would have been obvious to one skilled in the art to use such tuning elements as they provide effective tuning and for the advantages noted in pars. [0004]-[0005].

Response to Arguments

Applicant's arguments filed 8/11/2006 ("Response") have been fully considered but are not wholly persuasive.

Applicant argues against the prior rejections of claims 14 and 16 based on U.S. Patent No. 5,579,327 to Ohtatome et al. Response 10-12. The arguments are persuasive and the rejections withdrawn. Ohtatome does not disclose a modulator section, added to claim 14 by the amendment.

Applicant's remaining arguments, Response 12-17, boil down to one argument—that it is not inherent in the combination of Zah and Brosion that the facets of the integrated structure are

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coupled via a waveguide passing therethrough, the waveguide passing through the phase control section, and the waveguide passing through the modulator section, as claimed. The argument is not persuasive.

It should be noted that Zah itself implies that the examiner's statements are correct and the waveguide is inherent in Zah. First, Zah describes that the gain 16 and modulator 14 regions are formed on a "waveguide substrate 24." Col. 4 lines 34-52. What can this mean, if it does not mean that the entire device shares a waveguide?

Zah goes on to state that the modulator section "has a layer, in the waveguide region, with a bandgap wavelength . . ." Col. 5 lines 9-10 (discussing modulator on second section 34, which is merely a portion of waveguide substrate 24). Additionally, Zah notes that the light is taken as output from the "end of the waveguide 24." Again, what can Zah be referring to if there is not a waveguide common to all of the components? It is apparent that Zah includes a waveguide throughout the integrated structure, therefore all of the components—even those such as the phase section that would obviously be added in light of Brosnan—will necessarily include the common waveguide.

To support the argument that the presence of waveguides is not inherent, applicant states "[A] modulator section typically does not share a waveguide with other components in a tunable laser. Light is generally coupled to the modulator portion via lenses, and sometimes through other components." Applicant's statements have merit if the tunable laser is the type where the components are separate pieces, such as applicant's prior art Fig. 1a; the components cannot share a waveguide if they are separated and have elements such as lenses therebetween for coupling light. But Zah is not this type of laser. Zah is much like the present invention, the type

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of laser where all of the components at issue are integrated together as one piece. Such devices do not have lenses coupling light between the components, as asserted by applicant. Such devices are integrally grown on a common substrate and the components share many of the same layers, including the common waveguide.

Thus, it is believed that Zah sufficiently supports the examiner's assertion as to inherency, and applicant's arguments are not persuasive in rebutting the examiner's position. The rejections based on inherency are reiterated, and this action is made final.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

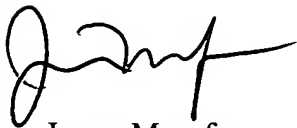
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (571) 272-1944.

The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



James Menefee
Primary Examiner
October 23, 2006